COORDINATION OF AUTOMATIC DATA PROCESSING IN THE NEW DEPARTMENT OF TRANSPORTATION

By

THOMAS P. SCHAEFER

COORDINATION OF AUTOMATIC DATA PROCESSING IN THE NEW DEPARTMENT OF TRANSPORTATION

by

Thomas Patrick Schaefer

Bachelor of Science

Coast Guard Academy

1956

A Thesis Submitted to the School of Government and Business Administration of the George Washington University in Partial Fulfillment of the Requirements for the Degree of Master of Business Administration

April 1967

Thesis directed by
John F. McCarthy, Jr.
Associate Professor of Business Administration

TABLE OF CONTENTS

INTRODUCTION

In recent months a Department of Transportation has come into being in the United States, joining together for the first time a previously scattered group of elements and responsibilities. Such an event creates both problems and opportunities for the participants and coordination assumes vital importance. This paper discusses the question of coordination of automatic data processing, under the assumption that action taken in this area will affect most other spheres of activity in the Department.

In chapter I the questions considered are: What is the Department of Transportation? Why was it created? What are its objectives?

Chapter II examines the individual elements of the new Department in terms of their size, functions, automatic data processing capabilities and applications.

In chapter III, answers to the questions of how much ADP coordination is required and how much is "right" are sought from varying standpoints. Consideration is given to governmental pressures and management theory, as well as to the attitudes and philosophies of concerned individuals.

Chapter IV discusses the steps already taken to coordinate ADP in the Department of Transportation starting before its creation and

continuing through February 1967.

The final chapter includes a summary of the characteristics and objectives of the Department and its elements, the pressures for coordination of ADP, and personal conclusions and recommendations for future action.

The chief objectives for undertaking research on this topic were to learn more about the new Department and to become more familiar with the field of automatic data processing. Methodology employed for research was divided nearly equally between reading and interviewing. Documents and books studied included the legislative history of the Department of Transportation Act, general literature relating to ADP and transportation, governmental Hearings and reports concerned with ADP, and other writings pertinent to the use of computers in large organizations. One or more persons concerned with ADP applications in each element entering the new Department were interviewed, as were representatives of the Bureau of the Budget and the General Services Administration. From a personal viewpoint, meeting these people and visiting their offices and ADP installations were probably the most interesting and rewarding phases of the research project.

Due to the current nature of the topic, some of the views expressed by concerned individuals have not been directly attributed to them. Many thanks are due, however, to all who had the patience and frankness to discuss the matter. Credit for much of the management

philosophy expressed herein is more properly due to the several Professors whose courses have related to the subject. Any mistakes or errors in applying their instruction can only be assigned to the author. Finally it must be stated that without the encouragement and cooperation of my wife and children, this paper could not have been completed.

CHAPTER I

THE DEPARTMENT OF TRANSPORTATION

What is it? . . . The Department of Transportation is a new arm of the Executive Branch of the Federal Government of the United States. It is the twelfth cabinet level department created since 1789. At inception it employs more than 94,000 persons, controls about $6 billion in annual government expenditures, and is responsible for over 120 programs and activities relating to transportation.[1]

Prior to 1966, the Department of Transportation was variously known as a time-honored proposal, a vitally needed agency, and a potential threat to the interests of individual segments of the industry. In the Congressional Hearings[2] which preceded its creation, those in favor of the new Department called it a fresh organizational approach to the complexities of government activity in the transportation field, as well as a vehicle for increased efficiency and economy. Less favorable characterizations included such phrases as a bureaucratic maze, a conglomeration, and a reshuffling of government agencies.

---

[1] "Untangling the Nation's Lifelines," Business Week, November 26, 1966, pp. 111-114.

[2] U. S. Senate, Committee on Government Operations, Hearings on S. 3010--Establishing a Department of Transportation. Parts 1 to 4. 89th Cong., 2d Sess., March-June 1966.

To the proponents of the Department who had hoped for broader powers and more functions included, the bill which finally passed the Congress represents half a loaf, but it is at least a first big step in the direction of coordinated policy and programs. Opposing views appear time after time in the Hearings from those who would retain separate organizational machinery for each mode of transportation. One critic felt that combining aviation with rail, road, and waterway would be

> like hitching a race horse, a quarter-horse, a Shetland pony, and a Clydesdale into a team. They are all horses, but they don't work well as a team and there is little merit in trying to make one out of them.[1]

The principal factor which will determine the success or failure of the team is the people on it. Here lies the most important answer to the question, "What is the Department of Transportation?" It is an organization of people, nearly 100,000 of them, with all the differences in age, skill, expectations, and other characteristics to be found in any large organization.

There are young secretaries just out of school and there are career men with only a year left to retirement. There are working mothers with sons in college and there are young bachelors with eyes on the clock and the secretaries. Some personnel in the new Department are military; most are civilians. Many are dedicated to the goals of their

---

[1] U. S. House of Representatives, Committee on Government Operations, Executive and Legislative Reorganization Subcommittee. Hearings on Creating a Department of Transportation. Part 2., 89th Cong., 2d Sess., 1966, p. 348.

agencies; others are just seeking experience before moving on to a more lucrative job.

This paper is concerned with coordination of Automatic Data Processing. What must not be lost sight of is that one can seldom ever coordinate things. One can only attempt to coordinate the actions of people. Recognizing the differences in people is a vital first step.

Why was it created? . . . The Department of Transportation was created primarily as an attempt to improve on an existing situation, i.e., the lack of coordination in government transportation policy, exemplified by the scattered responsibility for transportation programs among many elements of the Executive Branch. The wide dispersion of Federal activity in transportation as it existed prior to the Department of Transportation is shown in Appendix A of this paper. In transmitting his proposal for the new Department to the Congress, the President of the United States said:

> America today lacks a coordinated transportation system that permits travelers and goods to move conveniently and efficiently from one means of transportation to another, using the best characteristics of each.[1]

The Director of the Bureau of the Budget testified in support of the proposed change by saying:

> Today, transportation responsibilities are widely diffused throughout the Government. The lack of central leadership significantly

---

[1]Lyndon B. Johnson, cited in U. S. Senate Hearings on S. 3010 Part 1., p. 39.

> handicaps the development of unified transportation policies and a fully effective execution of Federal transportation programs.[1]

The belief that the present situation was inadequate did not reside solely in the minds of the Administration or the party in power, as shown by this statement from the Republican members of the House committee which studied the proposal:

> We believe that the need now exists for setting up the machinery to develop a coordinated and unified approach to transportation within the free enterprise system in order to attack problems, correct deficiencies, establish order, advance the art, and better assist the promotion of industry. The plethora of agencies dealing with the various modes and phases of transportation does not lend itself to a unified approach.[2]

Contrasting the situation in America up to 1966 with that in other countries, one writer said:

> Transport development in the United States is a function of many agencies, bureaus, and departments and, in particular, there is no one bureau, department, or ministry of transportation. This lack of a major center of responsibility is almost unique to the United States; no other major western industrialized country follows this practice to the same degree.[3]

In his discussion of the pros and cons of creating a cabinet level Department of Transportation, Mr. Meyer later said:

---

[1]Charles Schultze, cited Ibid., p. 78.

[2]Representatives Dwyer, Reid, Horton, Rumsfeld, Dickinson, Erlenborn, Wydler, and Brown, cited in U. S. House of Representatives, Committee on Government Operations Report No. 1701 on the Department of Transportation Act. 89th Cong., 2d Sess., July 15, 1966, p. 81.

[3]John R. Meyer, "Transportation in the Program Budget," Program Budgeting, ed. David Novick (Washington: Government Printing Office, 1964), p. 105.

> Perhaps the best argument for creating such a new department is that it could not possibly result in worse coordination of different federal transportation activities than now occurs.[1]

A need for improvement has long existed. Efforts to create a Department of Transportation go back many years. Specific legislative proposals have been offered more than 20 times in the years since 1874.[2] One specific area in which consolidation of information, expertise, and research efforts was forecast as potentially most beneficial was that of safety and accident prevention. It was felt that many common elements exist in accidents involving all modes of transportation. The similarity of human factors was underscored by Najeeb E. Halaby, former head of the Federal Aviation Agency and now a Senior Vice President for Pan American World Airways:

> We have right now some of the best studies in the world on the problem of head injuries due to pilots hitting the dashboard. Well, almost the same forces are involved in a driver hitting the dashboard of an automobile.[3]

Another cause for the creation of a Department of Transportation lies in planning for future needs, as expressed by Senator Magnuson:

> In a scant 35 years, a population nearly double that of today will need a 21st-century transportation system to move the travelers

---

[1] Ibid., 128.

[2] U. S. House Hearings on Creating a Department of Transportation, Part 2, pp. 819-824.

[3] U. S. Senate, Hearings on S. 3010, Part 3., p. 510.

> and goods of a new America. The Cabinet Secretary of Transportation can provide leadership in the development of a transportation system for the expanded needs of America in the coming century.[1]

The dynamic growth of transportation in the United States was underscored in the President's message previously mentioned. In the last 20 years the number of motor vehicles jumped from 31 million to 90 million; aircraft (non-military) increased from 38,000 to 97,000. Cargo movement in America increased from 619 billion ton-miles in 1931 to 1.5 trillion ton-miles in 1964.[2] In fiscal year 1966 more than $5 billion in Federal funds were invested in transportation--in highway construction, river and harbor development, airway operation, maritime subsidies, and other functions.

After hearing eleven days of testimony which fills 1200 pages, the Committee on Government Operations reported to the whole House:

> We propose, by the creation of a Department of Transportation, to lay the organizational base for coherent policy and efficient performance in another large and vitally important area of public concern--the movement of people and goods.[3]

What are its objectives? . . . The objectives of the new Department can be stated in either grandiose or minimal terms depending on the point of view of the speaker. In the declaration of purpose on page one of the Department of Transportation Act, the Congress stated

---

[1]Ibid., Part 1, p. 58.

[2]Ibid., Part 1, p. 38.

[3]U. S. House, Committee Report No. 1701., p. 5.

objectives in this fashion:

> To assure the coordinated, effective administration of the transportation programs of the Federal Government; to facilitate the development and improvement of coordinated transportation service, to be provided by private enterprise to the maximum extent feasible; to encourage cooperation of Federal, State, and local governments, carriers, labor, and other interested parties towards the achievement of national transportation objectives; to stimulate technological advances in transportation; to provide general leadership in the identification and solution of transportation problems; and to develop and recommend to the President and the Congress for approval national transportation policies and programs to accomplish these objectives with full and appropriate consideration of the needs of the public, users, carriers, industry, labor, and the national defense.[1]

Another expansive list of objectives was contained in the President's message requesting creation of the new Department:

> The Department of Transportation will--coordinate the principal existing programs that promote transportation in America; bring new technology to a total transportation system, by promoting research and development in cooperation with private industry; improve safety in every means of transportation; encourage private enterprise to take full and prompt advantage of new technological opportunities; encourage high-quality, low-cost service to the public; conduct systems analyses and planning, to strengthen the weakest parts of today's system; and develop investment criteria and standards, and analytical techniques to assist all levels of government and industry in their transportation investments.[2]

More pointed objectives have been suggested by others:

Reduce the multiplicity of reports and statistics by the various

---

[1] U. S. Public Law 89-670--Department of Transportation Act. H. R. 15963., 89th Cong., 2d Sess., October 15, 1966.

[2] U. S. Senate Hearings on S. 3010., Part I., p. 43.

segments making up the total transportation system.[1]

Get me to the suburbs as fast as I can get to Chicago . . .[2]

In general terms, the job of the new Department is to solve the transportation problems of the nation. It is almost an impossible task. The best that can be expected is improvement. The Task Force which worked to set up a departmental organization noted that the strength of new Department lies in its constituent agencies. The job of the Secretary and his central staff is to coordinate these individual agency capabilities into a team effort.

---

[1] RADM John Harllee, USN (Ret.), Chairman of the Federal Maritime Commission, cited in U. S. House Hearings on Creating a Department of Transportation., Part 1., p. 182.

[2] Man on a bus-stop, a Parker cartoon, The Washington Post, Feb. 6, 1967, p. A16.

CHAPTER II

INDIVIDUAL ELEMENTS OF THE DEPARTMENT

When President Johnson signed the Department of Transportation Act on October 15, 1966, he joined together a number of diverse bureaus and agencies. All perform transportation-related functions but there is considerable variation in their other characteristics. This chapter will summarize the nature and functions of each element, with emphasis placed on automatic data processing capability and applications.[1] An effort has been made to keep this discussion free of excessive quantitative data and equipment description. More detail of this type will be found in Appendix B. Additional details on ADP applications are included in Appendix C.

UNDER SECRETARY OF COMMERCE FOR TRANSPORTATION

The office of the Under Secretary had an authorized staff of 147 persons and a budget of about $28 million in fiscal year 1967.[2]

---

[1] References for material in this chapter are detailed in the BIBLIOGRAPHY and include Congressional Hearings, Bureau of the Budget Inventory of ADP, and a number of personal interviews.

[2] U. S. Senate Hearings on S. 3010., Part 2, p. 174.

This element was the principal Executive advisor in all matters relating to transportation and was charged with general responsibility for fostering, promoting, and developing the nation's transportation facilities. The incumbent, Hon. Alan S. Boyd, is now the first Secretary of Transportation.[1] In addition to broad policy development and supervision of the staff elements immediately below, the Under Secretary was responsible in the Commerce Department for the activities of the Maritime Administration, Bureau of Public Roads, Great Lakes Pilotage Administration, and St. Lawrence Sea-Way Development Corporation. All of these elements except the Maritime Administration were transferred to the new Department.

OFFICE OF TRANSPORTATION POLICY DEVELOPMENT. This office develops over-all transportation policies and plans, identifies major transportation problems, and proposes research or other actions. It does not use Automatic Data Processing services at this time.

OFFICE OF TRANSPORTATION PROGRAMS. Another staff element which will accompany the Under Secretary into the New Department is the program office which administers the Aviation War Risk Insurance Program and the Aircraft Loan Guarantee Program, and helps to coordinate the activities of the line agencies mentioned above. ADP services are not presently used.

---

[1]Sworn into office Jan. 16, 1967.

OFFICE OF TRANSPORTATION RESEARCH. This office conducts research projects directly or through contract, and furthers research information to assist in broad policy development. Although not using ADP services at this time, the use of ADP in the future is anticipated.

OFFICE OF TRANSPORTATION DATA SYSTEMS. The program with which this office is principally concerned is the collection of statistical information by transportation carriers. The Acting Director, Mr. Robert Brown,[1] explained their efforts to achieve similarity and compatibility between data elements and codes, so as to improve the meaningfulness of comparisons. Such areas as the geographic coding of origin-destination data, and the commodity coding of the various carriers represent major problems. This office utilized the ADP capability of the Bureau of Census to fill its data processing needs from the Census of Transportation taken in 1963.[2] Similar arrangements will probably be made for the Transportation Census of grain, livestock, fruit, minerals, and other items to be taken in 1967. Future plans include changing the name of this office from Transportation Data Systems to Transportation Information Planning, which will remove the erroneous impression that its area of responsibility includes ADP equipment.

---

[1]Interview, January 25, 1967.

[2]Included in the 1963 Census of Transportation were surveys of Manufactured Commodities, Passenger Transportation, Truck and Bus Carrier inventory and usage.

OFFICE OF EMERGENCY TRANSPORTATION. This office develops and coordinates plans and policies for centralized control of all modes of transportation in the event of emergency or mobilization. A chief concern is the proper allocation of civil transportation capacity to meet both military and civilian needs. ADP services comprising 5 to 10 computer hours per year have been obtained from the Office of Emergency Planning computers at the National Research Evaluation Center.

OFFICE OF HIGH-SPEED GROUND TRANSPORTATION. This office is responsible for planning and carrying out a program of research, development, and demonstration for high-speed ground transportation. The Transport Systems Planning Division conducts developmental studies, using ADP services from the National Bureau of Standards or contracts with commercial firms. Another element of this office, the Demonstration Division, is presently using an IBM 1440 12K computer with a Kimball KR 1200 Reader on-line to process and accumulate railroad passenger data in the Northeast Corridor. Conductors on all Pennsylvania and New Haven Railroad trains between Washington, D. C. and Boston punch a color-coded ticket for each passenger to show city of origin and destination and whether coach or first class facilities were used. Train number and date are also recorded. As explained by the Chief of the Division,[1] this information is supplemented by surveys

---

[1] Interview with Mr. Robert Haden, 25 January 1967.

of travelers and non-travelers taken on trains and in homes.

The specific purpose of this application is to determine the potential contribution of High-Speed Ground transportation in the Corridor, by measuring and analyzing public response to present or future changes in service.[1] Problems include rough handling of tickets by passengers which hampers later automatic processing, incorrect punching by conductors, and lost tickets.

BUREAU OF PUBLIC ROADS

The Bureau had an authorized staff of 5,755 persons and a budget of nearly $4.5 billion in fiscal 1967.[2] This huge sum, which will represent nearly 3/4 of the new Department's expenditure authority, is almost totally derived from highway-user taxes, such as gasoline and diesel fuel taxes. The Bureau administers two major highway construction and development programs in conjunction with State officials. The Federal-aid to primary and secondary systems program has been in effect since 1916, with the Federal government paying half the cost of the nearly 850,000 miles of roads included. Since 1956, the National System of Interstate and Defense Highways program has been 90 per cent supported by Federal funds and will comprise 41,000 miles of controlled-access highways when completed in 1973.

---

[1] It appears that this system could be applied to any mode of transportation or geographical area, with minor changes. Cooperation of the carriers involved would be essential.

[2] U. S. Senate Hearings on S. 3010., Part 2, p. 175.

Other major functions of the Bureau include highway research, planning, and safety. Beautification has recently assumed greater importance, as has the National driver registration program. Aid to other nations in developing highway organizations and programs and assistance in the construction of the Inter-American Highway from the United States to Panama are also Bureau responsibilities.

At their Washington, D. C. headquarters the Bureau is presently[1] operating two computer systems in parallel. Being phased out is an IBM 7010 60K system with two IBM 1401 auxiliary computers which are used primarily for input-output to the 7010. The new system which was installed in December, 1966 consists of an IBM 360 model 50 computer with 262K. A wide range of applications is processed which can be broken down into three areas. Administrative uses include payroll, personnel, accounts, budget, program analysis, and project accounting for each Federal-aid construction project. A second major area, the National driver registration program, accounts for nearly one third of total computer hours. In this application the Bureau maintains about two million records on previous driver's license revocations. Any State desiring to do so may forward names of new applicants for a driver's license and will receive back information of previous revocation by any other State.

---

[1]January 24, 1967. Persons interviewed included Mr. Keith Kohler, Chief, Computer Services Division; Mr. Ken Close, Chief, Systems and Programming Branch; and Mr. James Ledford, Planning Staff.

The third general area of usage comprises engineering and technical applications, design and research computations, planning, safety, and operational programs, right of way and location studies, and various statistical summaries.

Four regional offices under the Bureau of Public Roads also utilize computers, principally for engineering and design applications similar to the third category above. The computer model presently in use at the San Francisco, Vancouver, and Arlington regional locations is an IBM 1401 whereas the Denver office uses an IBM 1620.

UNITED STATES COAST GUARD

The Coast Guard had an authorized staff of 35,339 military and 5,881 civilians and a budget of just over $500 million in fiscal 1967.[1] A military service, the Coast Guard maintains readiness for operation under the Navy in time of war or at the direction of the President. Peacetime functions include search and rescue services, oceanographic research, merchant marine safety including licensing of mariners and inspection of vessel construction and repair, and enforcement of Federal maritime laws.

The Coast Guard also operates and maintains a comprehensive system of aids to navigation for inland and off-shore maritime users, and for trans-oceanic aircraft. Port security, icebreaking, and ice patrol

---

[1] U. S. Senate Hearings on S. 3010, Part 2, p. 180.

services are also provided.

The Coast Guard operates three computers in the Washington, D. C. area at present. The smallest, a Control Data Corporation PDP-5 paper tape unit, is used in conjunction with a radio-teletype network to process oceanographic observation data recorded by Coast Guard vessels and forwarded by message. In one application, corrected readings are reported to the Navy Fleet Weather Center, Monterey, within 12 hours from the time of original recording at sea.[1] A marked increase in the number of oceanographic observations and potential applications in this rapidly growing field suggests a need for greater ADP capability.

The administrative data processing at Coast Guard Headquarters is performed on an IBM 1410, 40K system. Applications include personnel accounting (military, civilian, reserve, and retired), payroll, financial and property accounting, program budget, and various statistical applications in such fields as search and rescue, motorboat accidents, merchant vessel casualty cases, and field unit operations.[2]

An IBM 1130 computer with 8K word memory is used by Coast Guard engineers for such design and computational applications as

---

[1]Interview with CDR. R. Dinsmore, Commanding Officer, Coast Guard Oceanographic Unit; and LCDR K. Palfrey of his staff on January 25, 1967.

[2]Interviews with CDR. C. Unsinn, Chief Data Processing Division USCG on January 18, 19 and February 1, 1967.

spectrum analyses for LORAN-C (a long range electronic navigational aid); candlepower and signal light intensity analyses; buoy design; time-difference, base-line and azimuth calculations (also for LORAN-C), and similar programs.[1] A recent application with apparent potential for other users is a Monte Carlo model for simulating helicopter engine operation.

Since 1958, the Coast Guard has operated a computer-based merchant vessel reporting system (AMVER) which provides the current position of vessels and other vital information for use in search and rescue cases. Coverage was expanded in 1965 to include the Pacific Ocean as well as the Atlantic. The computer presently used with this system is an IBM 1401 with 12K located in New York City. An IBM 1620 model, used only for educational purposes, is located at the Coast Guard Academy in New London, Connecticut. The Coast Guard Yard, a vessel repair facility located at Curtis Bay, Maryland, uses an IBM 1401, 4K system for engineering and administrative purposes. In Elizabeth City, North Carolina, applications relating to aircraft maintenance as well as administration are performed on the IBM 1440 at the Aircraft Repair and Supply Center. A supply-oriented Honeywell 120 system will be installed at the Coast Guard Supply Center Brooklyn,

---

[1] Interviews with ENS's Wegner and DeChamps, Engineering Division, Coast Guard Headquarters on January 19, 1967.

New York, in December 1967.[1] EAM punched card systems are used for administrative functions in the twelve Coast Guard District offices located throughout the United States, including Hawaii and Alaska.

FEDERAL AVIATION AGENCY

The Federal Aviation Agency had an authorized staff of 44,232 persons and a budget of just over $1 billion in fiscal 1967.[2] Tasks include promoting and developing air commerce and civil aviation; regulation and control of air space; research and development in a variety of air related fields; registration of aircraft; examination of pilots; and furnishing technical assistance to other countries.[3] Facilities operated by the FAA include Dulles International and Washington National Airports; control towers at more than 250 other airports; twenty air route traffic control centers; and a number of flight service stations and air navigational aids.

In addition to responsibility for the supersonic transport (SST) program, FAA is active in the vertical takeoff and the short takeoff and landing (VTOL and STOL) programs. Under development is an all-weather landing system which will permit airport operations under

---

[1] Interview with LCDR J. Morrow, Chief, Management Sciences Branch, Coast Guard Headquarters on January 19, 1967.

[2] U. S. Senate Hearings on S. 3010., Part 2, p. 179.

[3] U. S. Federal Aviation Agency, The Federal Aviation Agency, September, 1964, pp. 1-20.

zero visibility conditions. Extensive use of Automatic Data Processing in both research and operational programs characterizes this agency.

Administrative processing at the Washington, D. C. headquarters is performed on an IBM 1401, 16K computer scheduled for replacement by an IBM 360 model 30, 32K system in May 1967.[1] Applications include facility record maintenance, payroll, general accounting, cost accounting, personnel, property inventory, and the civil notice to airman (NOTAM) system. A military NOTAM system presently operated by an Air Force detachment in the FAA headquarters is scheduled to be combined with the civil system.[2] Both convey information to pilots and other interested parties concerning condition of radio aids, airports, and lights.

FAA Regional Offices at Anchorage, Honolulu, Los Angeles, Fort Worth, Kansas City, Atlanta, and Jamaica, New York utilize IBM 1401 card-oriented computers for business and administrative purposes. Applications include payroll, general and cost accounting, and FAA aircraft and facility record maintenance.

The FAA Aeronautical Center in Oklahoma City is the principal supply, training, equipment repair, and record-keeping facility for the agency. Computers presently used include IBM 7040, 1401, and 360 model 30 systems. Applications include maintenance of central files for pilot licenses and medical records, aircraft registrations, and other

---

[1]Interview with T. Grieg, Computer Operations Branch, Jan. 23, 1967.

[2]Interview with Sgt. W. Braddock, USAF, Jan. 23, 1967.

aviation information systems as well as payroll, accounting, supply, inventory, and property records.[1]

The National Aviation Facilities Experimental Center (NAFEC) in Atlantic City, New Jersey conducts a major portion of the research, development, testing, and design work performed by the FAA. Some administrative work is processed on an IBM 1401 ccomputer, but the large scale IBM 7090 system is mainly used for simulations and other experimental projects in such areas as air traffic control and all-weather landing systems. NAFEC is also the site of the first of twenty IBM 9020 systems which will be installed in air route traffic control centers around the country in the next few years. This air traffic control system represents the largest computer application in terms of cost and capability coming into the Department of Transportation and is discussed in more detail below.

Air traffic controllers at each of the route centers and airport towers use flight plan inputs, weather data, radar presentations, and other inputs to control the movement and spacing of aircraft in their sectors and to pass each flight to the next sector at the appropriate time. The multitude of variables and calculations required in this 24 hour 365 day a year operation create a need for reliable automated systems. UNIVAC File computers are presently used in the air route traffic control

---

[1]Persons interviewed with respect to general purpose systems include J. Rickard, M. Francis, and L. Yarnell at FAA HQ, January 23, 1967.

centers (ARTCC's) in Nashua, New Hampshire; Oberlin, Ohio; Indianapolis, Indiana; and Leesburg, Virginia. The ARTCC in Ronkonkoma, New York has an IBM 1410 and an IBM 1401 installed. The SAGE facility at Great Falls, Montana performs double duty as an ARTCC and an Air Defense Command center.[1]

Each of the twenty new IBM 9020 systems being phased in will cost from $12 to $15 million depending on the specific configuration and amount of memory required at the individual ARTCC. In addition to assisting human controllers by computing safe routes, spacing, and other information for each flight on a continuous, future basis, the system will have the capability of placing an electronic tag next to each radar target on the controller's scope, telling him the plane's flight number, altitude, and whether it is climbing or descending. The 9020 systems are of modular construction with physically separate storage, computing, and control elements in the central processor. Multiples of each element are provided which can be joined in any desired combination. This is called a "fail safe, fail soft" system by the Federal Aviation Agency. The second of the IBM 9020 systems was recently installed at the ARTCC in Jacksonville, Florida where it is currently going through the test phase.[2] Central programming for all 9020

---

[1] Interview with Lt. Col. A. B. Cowart, USAF, presently assigned with FAA in Configuration Mgt. Branch on January 30, 1967.

[2] Interview with Mr. J. R. Seitz, Chief Test Branch, National Airspace System Program Office of FAA on January 30, 1967.

computers will be performed at the NAFEC facility in Atlantic City. Future plans call for extension of the system to major terminals as well as ARTCC's. There is also a possibility that the standby capacity of the 9020 computers can be used to take over some of the administrative data processing for FAA.

BUREAU OF RAILROAD SAFETY AND SERVICE

and

BUREAU OF OPERATIONS AND COMPLIANCE

These segments of the Interstate Commerce Commission had a staff of 497 persons and a budget of about $6 million in fiscal 1967.[1] Functions transferred to the new Department of Transportation include preparation and administration of safety regulations for railroad trains, locomotives, motor vehicle carriers (bus and truck), and pipelines (except natural gas.) In addition to inspecting carrier equipment, operations, and records and investigating serious accidents, these offices receive carrier reports and publish various statistical bulletins. The safe packing and transportation of dangerous articles and explosives come within the responsibility of this element.

Computer programs are presently utilized by one section in each Bureau and are currently processed on the Interstate Commerce

---

[1] U. S. Senate Hearings on S. 3010., Part 2, p. 183.

Commission's RCA 301, 20K computer located in the Washington, D. C. headquarters building. Most relate to rail accidents and motor carrier accidents and the input data is taken from carrier reports and records of investigation. Another set of programs relates to equipment inspections. Since most of the programs are written in RPG language for the RCA 301 and are not compatible with the IBM equipment of the other elements coming in to the Department of Transportation, special arrangements or reprogramming will be required.[1]

GREAT LAKES PILOTAGE ADMINISTRATION

The Great Lakes Pilotage Administration had an authorized staff of six persons and a budget of about $97 thousand in fiscal 1967.[2] Functions include regulation of pilotage on the Great Lakes, establishing rates and charges for pilot service, and registration of Lake pilots. The Administration acts jointly with its Canadian counterpart in establishing standards and rates. No automatic data processing services are currently used by this element.

SAINT LAWRENCE SEAWAY DEVELOPMENT CORPORATION

The Saint Lawrence Seaway Development Corporation had an authorized staff of 162 persons and a capital value--net worth of just over $118 million in fiscal 1967.[3] The Corporation operates on a

---

[1] Interview with C. Greene of ICC Program Staff, Jan. 25, 1967.

[2] U. S. Senate Hearings on S. 3010., Part 2, p. 178.

[3] Ibid., p. 177.

self-supporting revolving fund basis utilizing tolls as a chief source of revenue to defray cost. In addition to operation and maintenance of the Seaway, necessary dredging and construction work is performed jointly by the Corporation and the Saint Lawrence Authority of Canada. This latter agency currently provides automatic data processing services to the Corporation in the areas of statistical data and billings, on a reimbursable basis.

BUREAU OF SAFETY OF THE CIVIL AERONAUTICS BOARD

The Bureau of Safety of the CAB had an authorized staff of 186 persons and a budget of nearly $3.5 million in fiscal 1967.[1] Functions include investigating all fatal accidents involving civil aircraft; recommending probable cause for all accidents (including those non-fatal fixed wing accidents investigated by the Federal Aviation Agency); publishing reports on accidents and causes; and making analyses and recommendations toward reduction of future accidents.

Although the Bureau of Safety has no ADP equipment of its own, it has made extensive use of the IBM 360 model 30, 64K system which services all elements of the Civil Aeronautics Board.[2] The Analysis Division of the Bureau of Safety prepares a data sheet for every aircraft

---

[1] U. S. Senate Hearings on S. 3010., Part 2, p. 182.

[2] Interviews with Mr. A. Goldman, Chief of Information Service and Program Section and Mr. F. Hollowell, Chief of Analysis Division, Civil Aeronautics Board on Jan. 30, 1967.

accident, which is then transformed into punched cards and magnetic tape. Through a series of computer programs this historical file can be used a number of ways. Finding similarities in accident characteristics, as an aid to analyzing causes, is one important application. It is also used to prepare reports and summaries for in-house and public use.[1]

Additional ADP applications in the Bureau of Safety are presently limited to two FORTRAN programs used by the Engineering Division to obtain information from a plane's Flight Recorder. If this instrument is salvaged from an accident, such parameters as heading, air speed, altitude, gravity and wind force can be printed out for any desired time increments prior to the accident.

ALASKA RAILROAD

The Alaska Railroad had an authorized staff of 930 persons and a capital value--net worth of about $136 million in fiscal 1967.[2] Financing is conducted on a revolving fund basis similar to that used by the Saint Lawrence Seaway. In addition to operating and maintaining 483 miles of railroad, this element controls a tug and barge line, docks

---

[1] The accident analysis and statistical reporting functions for aircraft, railroad, motor vehicle, motorboat and vessel presently carried on by different elements of the new Department, with varying degrees of automation, appear on the surface to offer some potential for integration. Procedural differences such as codes, type and amount of information required are significant but not unresolvable.

[2] U. S. Senate Hearings on S. 3010., Part 2, p. 181.

and terminals. The chief objective of the Alaska Railroad is to promote the development and settlement of the largest State. An IBM 1440 computer located in Anchorage performs administrative data processing functions.

This completes the list of physical elements united by the Department of Transportation Act of October 15, 1966. Certain other responsibilities and functions which did not include "people transfers" were also assigned to the new Department. As shown by Appendix A, many transportation elements of the Executive Branch were excluded by the legislation. Although this chapter is not concerned with the causes of that action, it should be pointed out here that many of the excluded elements also use ADP in some degree. Their systems should be considered in any future studies of or reorganizations of governmental ADP activity in the transportation field. One example is the statistical processing and analyses of vessel movements and cargo performed by the Maritime Administration in the Department of Commerce.[1]

This description of the size, functions, ADP capabilities and applications of the elements entering the new Department has pointed

---

[1]U. S. House of Representatives, Committee on Post Office and Civil Service, Subcommittee on Census and Statistics. Hearings on Government Electronic Data Processing Systems. 89th Cong., 2d Sess., June 1966., p. 400.

up some similarities, but also a vast range of differences. The next chapter will discuss the pressures for coordination of these automatic data processing systems and the amount of coordination required.

CHAPTER III

COORDINATION OF AUTOMATIC DATA PROCESSING

Governmental pressures to coordinate automatic data processing in the new Department of Transportation include both the government-wide pressures to coordinate ADP which have grown stronger in recent years and the particular need to coordinate transportation policies and activities which led to creation of the Department. This chapter will examine these forces in some detail as well as considering some of the broader aspects of information system coordination and the attitudes and philosophies of individuals. The unique requirements and opportunities of an organization which comes into being suddenly, rather than slowly and traditionally, are discussed, as well as the special needs of program budgeting.

In the late 1950's, it became evident to both the Executive and Legislative sides of the government that ADP and particularly electronic computers could no longer be managed in the generalized fashion of other office equipment. The General Accounting Office published its first study on ADP management in government in 1958 and the Bureau of the Budget completed a study on ADP responsibilities in 1959.[1] A need for

---

[1] Appendix D to this paper includes specifics for governmental studies, reports, and items of legislation referred to in this chapter.

specialized management and Government-wide coordination was recognized. In 1960, the Bureau of the Budget published guidelines for studies to precede the acquisition of ADP equipment (Bulletin 60-6) and the GAO made another comprehensive report to the Congress calling for more positive central planning to promote efficiency, economy, and effectiveness in ADP administration and management.

Circular A-54 issued by BOB in 1961 outlined policies for selection and acquisition of ADP equipment including exact system specifications and lease versus purchase evaluations as principal considerations. Commencing in 1962 agencies were required to furnish annual reports on ADP inventories and utilization to BOB. The 1963 report of GAO stressed the dollar savings which could be achieved if the Government purchased a larger portion of its ADP equipment, and again cited a lack of effective coordination by the Executive branch. A bill to provide for increased government-wide coordination was passed by the House in 1963 (H.R. 5171) but was not acted upon by the Senate. BOB Circular A-61, issued in 1963, contained revised guidelines for appraising agency practices in the management of ADP equipment and recommended that a central ADP authority be set up in each Federal agency. This central staff was expected to coordinate the programs of individual elements of the agency, to assure compliance with policies of higher authority, to encourage agency-wide and interagency planning and integration, and to foster and coordinate time-sharing of equipment.

The 1964 report of the Comptroller General noted some improvements in government ADP management but was critical of the agency-by-agency approach. It stressed the point that maximum economy and efficiency in procurement and utilization of equipment could not be achieved without centralized coordination which would consider overall Government interests. BOB Bulletin 64-9 announced the establishment of an experimental computer sharing service at the National Bureau of Standards and BOB Circular A-27 extended and expanded the computer sharing program to other areas. The General Services Administration was given the job of coordinating a sharing program for all Executive agencies.

The results of an extensive study of ADP management practices in government, sponsored by the Bureau of the Budget, were published in early 1965.[1] On March 6th of that year, BOB issued Circular A-71 which implemented the recommendations of the study by defining the ADP management responsibilities of BOB, GSA, the National Bureau of Standards, and the Civil Service Commission, as well as those of individual agency heads. BOB was designated as the source of overall leadership and coordination while GSA, NBS, and CSC were assigned specific responsibilities for equipment, technical assistance, and personnel. Agency heads were charged with a number of specific

---

[1] Commonly referred to as the "Clewlow Report," for Mr. Carl W. Clewlow who directed the staff work for the study.

responsibilities which are repeated here verbatim since they represent the most comprehensive official answer found during this study to the question "What coordination of data processing is required in the new Department of Transportation?":

7. Responsibilities of the heads of executive agencies. The heads of all executive departments and establishments are responsible for the administration and management of their automatic data processing activities including:

   a. Agency-wide planning, coordination and control of equipment utilization.

   b. Determination and use of those equipment applications that offer the greatest return in terms of increased effectiveness in mission accomplishment and higher productivity.

   c. Development of data systems that employ the use of the most advanced design techniques.

   d. Merger or integration of data systems irrespective of intra-agency or interagency organizational lines, /Italics mine/ when cost effectiveness in equipment utilization, data systems management, or program accomplishment can be increased.

   e. Determination of automatic data processing equipment requirements.

   f. Sharing equipment time and services within the agency, and with other agencies through support of the Government-wide program for sharing exchanges; cooperation in the establishment of service centers and other interagency joint use arrangements.

   g. Consideration of the potential impact of the introduction of ADP equipment on the agency work force and taking such steps as are necessary to alleviate adverse effects to the greatest extent practicable.

   h. Participation in Government-wide studies and programs for improving the administration and management of

automatic data processing activities in the executive branch.[1]

The General Accounting Office and certain Congressmen did not believe that the guidelines for ADP management set forth by BOB were sufficient in themselves. During the 1965 Hearings on H.R. 4845 they called for increased centralized management and coordination on a government-wide basis. Frequent mention was made of the some 100 audit reports from GAO between 1958 and 1965 which revealed deficiencies in ADP management on the part of individual agencies, despite BOB directives then in effect.

H.R. 4845[2] became law under the title of P.L. 89-306 late in 1965. The Administrator of General Services was given primary operational responsibility for coordinating ADP management on a government-wide basis. The Bureau of the Budget retained fiscal and policy control while the National Bureau of Standards was charged with providing technical support and advisory services to individual agencies. Responsibility for determining internal ADP requirements and systems design remains with the using agency, while procurement is to be made by GSA from a revolving fund. Hearings on government electronic data processing systems held by a House subcommittee in June 1966 indicate

---

[1]U. S. Bureau of the Budget Responsibilities for the Administration and Management of automatic data processing Activities. Circular No. A-71., (Washington: March 6, 1965), pp. 4-5.

[2]Commonly referred to as the "Brooks Bill," for its originator, the Hon. Jack Brooks, Representative from Texas.

that the full impact of the legislation has yet to be felt by most government agencies. An indication of future trends is provided by recent developments within the Department of Defense.

A more rigid system for coordination of management information systems was announced by Secretary McNamara during July 1966. Pointing out that DOD operated almost 2,000 of the 2,600 computers used by the Federal Government at that time, Mr. McNamara urged DOD managers to set an example for the rest of the government to follow:

> It is essential that we increase our efforts to improve the use of computers. Defense managers must educate themselves on the uses and capabilities of the computer; evaluate and clearly state requirements for management information; and exercise positive direction to ensure that these requirements are met by the computer system.
>
> . . . . . .
>
> We must take advantage of the tremendous capabilities of the computer for data collection and analysis. We can no longer tolerate computer systems which are merely reflections of earlier manual and punch-card systems, but must insist on systems which satisfy our total management and operating requirements and which exploit the unique capabilities of the computer.
>
> . . . . . .
>
> We must develop and install standard data systems within the DoD at a level far exceeding our current practices. These standard data systems must be developed for research and development and operational systems as well as business management-type needs. These systems should be designed to provide for uniform integration within functions on a service/agency-wide basis. Standardization is mandatory for all systems with multi-activity application opportunities. This requires centralized systems design/machine programming

at the highest level pertinent to the system application.[1]

It is not being suggested here that all agencies must adopt the practices and philosophies of the Defense Department but it is believed that Mr. McNamara's policy statement is representative of the current trend in the Federal Government. As standardization and integration of ADP systems and information networks increases, autonomous computer installations will become more the exception than the rule. This is the environment faced by the Department of Transportation as it commences operations.

Accepting a responsibility for increased coordination in the automatic data processing area should not be particularly difficult for an agency which was primarily created for the purpose of coordination. The words coordination, coordinate, and coordinated appear 13 times in the 3 1/2 page statement of objectives submitted to the Congress.[2] The special significance of coordinating successfully was emphasized in an editorial which dealt with the elements and responsibilities not placed in the new Department:

---

[1]U. S. Secretary of Defense Memorandum "Management and Use of the Electronic Computer," Washington, D. C., July 29, 1966, pp. 1-2. Reprinted as enclosure(2) to Secretary of the Navy Notice, "Annual Guidance for the Preparation of Management Information Systems Plans and ADP Plan Supplements," SECNAV NOTICE 5200, OMI:SDD, Jan. 13, 1967.

[2]U. S. House Hearings on Creating a Department of Transportation, Part II, pp. 760-63.

> Because of the objections of fiercely competing interest groups, the new Secretary will not be able to make a frontal assault on the problems of coordinating the various transport services and ensuring the efficiency of public investment in new facilities. To accomplish these ends the Department of Transportation must have a voice in regulation of rates charged by the common carriers as well as in the investment decisions that are now made by a half dozen unrelated Federal agencies.
>
> The best hope for causing the necessary powers to gravitate toward the Department of Transportation lies in excellent performance. If Mr. Boyd can accomplish the speedy and smooth integration of the existing agencies in the new Department, a compelling case can later be made for new and broader powers.[1]

Much of the testimony during the Hearings which preceded the Transportation Act centered on the question of the amount of power to be placed in the office of the Secretary. The Chairman of the Transportation Committee of the Second Hoover Commission stated that the new Department should be left in a posture which would permit the Secretary to exercise his own organizational judgment. He gave this reason for his recommendation:

> A Department of Transportation, properly administered and realistically and ruthlessly drawing together the transportation functions and activities covered by S. 3010, can substantially contribute toward governmental simplification, efficiency, and reduced federal expenditure.[2]

Effective coordination of the diverse elements which make up the new Department will require both power and strength. On the date he signed the Transportation Act, President Johnson said that it would be

---

[1] Editorial, The Washington Post, Nov. 9, 1966, p. A 24.

[2] Mr. Perry M. Shoemaker, cited in U. S. House Hearings on Creating a Department of Transportation, Part II, p. 712.

a mammoth task to untangle, coordinate and build the national transportation system. The Chief Executive told a group of guests assembled at the White House on that occasion what kind of man he wanted for the post of Secretary of Transportation:

> Because the job is great, I intend to appoint a strong man to fill it. The new Secretary will be my principal adviser and strong right arm on all transportation matters.[1]

Three months later, at the swearing-in ceremony for the newest member of the Cabinet, the President described the task facing Mr. Boyd in these terms:

> Alan Boyd will undertake a major assignment in attempting to coordinate a national transportation policy for this land of ours. He will attempt to get economy and efficiency, and give the kind of results that the American people would like to point to with pride.[2]

Much of the justification for establishing a separate Department of Transportation was based on the cornerstones of economy and efficiency. In both Senate and House Hearings, witnesses frequently referred to potential dollar savings which could be realized after its creation. Automatic data processing was often mentioned as a fruitful cost-reduction area. The Director of the Bureau of the Budget told the Senate Committee on Government Operations that:

> There should be possibilities for immediate savings through sharing computer time. The prospects for long-time savings

---

[1]Quoted in The New York Times, October 16, 1966, p. 1.

[2]Quoted in The Washington Post, January 17, 1966, p. A 2.

> through coordinated or consolidated computer operations are excellent.[1]

The head of the Federal Aviation Agency, which brings the largest ADP budget and capability into the Department, reinforced this view:

> I think economies are possible, because when you bring all of the different agencies and functions in the Department of Transportation, then you can start to consolidate overhead. For example, one tremendous area is in the ADP, automatic data processing, where you can get more utilization out of your computers, for example on payrolls, also many other areas.[2]

After the Hearings, the Committee on Government Operations reported favorably on the Transportation Act to the whole House of Representatives and cited several specific areas for potential economy in ADP. Noting that there were 44 computers at 21 different cities involved in the transfer, the Committee Report stated that savings of $221,000 might be achieved within two years. These savings would come from transferring ADP work performed by contractors to in-house computers and also from making more effective use of present computers. Commencing with the third year after creation of the Department, annual ADP savings of $400,000 were predicted if certain actions were taken:

> These might develop through consolidation of Washington headquarters computers into a departmental data processing center

---

[1] Hon. Charles Schultze, Senate Hearings on S. 3010, Part I, p. 82.

[2] Gen. William F. McKee, House Hearings on Creating DOT., p. 136.

and centralization of personnel and payroll data processing functions.[1]

Further long-term improvements in computer usage, requiring in-depth study, were noted as possibly saving up to $1,670,000 per year. The use of FAA Air Route Traffic Control Center reserve computer capacity was mentioned as being several years away, but it was stated that such use, if feasible, would eliminate the need for several small computers.

These potential economies were suggested to the Congress by the Bureau of the Budget and were arrived at in a study conducted by representatives of BOB and the individual agencies. As will be discussed in more detail in chapter IV of this paper, the study included the Maritime Administration which was not finally placed in the Department of Transportation. Further, the study was admittedly a broad survey and it was noted that each item of potential savings would require individual in-depth study before positive action could be taken.

Nonetheless, since ADP savings were used as one justification for the new Department, it is reasonable to expect that some members of the Congress with long memories will be inquiring in future Hearings on budgetary and other matters what has been accomplished along these lines. Since most of the computer usage improvements

---

[1]U. S. House, Committee Report No. 1701, p. 27.

involve more than one element, coordination at the Departmental level is essential. There are too many real problems and complexities involved with any change in computer systems to expect the operating agencies to undertake the necessary in-depth studies without impetus being provided from the Departmental echelon.

No criticism is intended of the operating elements or their willingness to be coordinated and to cooperate in cost-reduction programs. The fact remains that their principal and valid concern is with the day-to-day execution of the programs and activities for which they are responsible. ADP coordination for the realization of savings is principally a responsibility for a central ADP management staff.

The job of the staff in this regard has been made easier by recent trends in the ADP field. The latest UNIVAC computers, series 9000, have been reported to be compatible in many respects with the IBM system 360 computers. According to one writer, the decision which led to this increased compatibility between the equipments of these two large manufacturers:

> Represents a giant step toward improved communication among computers, lower re-programming and retraining costs, lessened dependence upon a single equipment supplier, and greater standardization throughout the industry.[1]

It would be unwise however to suppose that, because standard codes, compatible equipments, and common languages such as COBOL

---

[1] John R. Hillegas, "The New UNIVAC 9000 Series," Data Processing Magazine, August, 1966, p. 53.

and FORTRAN have become increasingly prevalent, the coordination of ADP systems and installations is a simple matter. Knowledgeable persons interviewed during this study almost universally pointed out that there are countless differences between computers and between the systems of which they are an integral part. One illustration of the dangers of an oversimplified approach lies in the subject of monthly usage rates for different computers. A computer which runs 24 hours a day the year round may be programmed inefficiently or may be performing tasks which should not have been placed on a computer in the first place. Another computer with considerably less hours per month to its credit may be contributing greatly to the objectives of the organization and may actually be saving money also, because of the nature of the jobs it performs and the efficiency of its programming.

The Clewlow Report emphasizes the need for caution in searching for simple solutions in the opening paragraph of its first chapter:

> Failure to give adequate recognition to the differences that exist among computer installations has complicated the problems of management and contributed to misunderstanding. These differences are due to variations in the missions of agencies using the installations, in operating objectives, and in operating requirements surrounding the use of computers. Also, installations vary in respect of the qualifications required of their staffs and the kinds of equipment that are used. The purposes for which computers are used cover the breadth of governmental activity.[1]

---

[1] U. S. Senate, Committee on Government Operations. Report to the President on the Management of Automatic Data Processing in the Federal Government. Document No. 15, 89th Cong., 1st Sess., March 4, 1965, p. 9.

Further complications arise when computers are considered in the context of a larger management information system complex. Management theorists differ substantially on what constitutes the best type of management information system for a large organization. Issues which quickly come to the surface in this type of discussion include the proper location for decision-making functions, centralization versus decentralization, and line authority versus staff responsibility. While it is not the purpose of this paper to prescribe a management system for the Department, it would be taking too narrow a view to discuss ADP coordination without mentioning the broader aspects also.

John Dearden has pointed out that management's first concern should be the adequacy and quality of its information system, particularly with respect to strategic planning and management control.[1] There are techniques available at present for achieving any level of automation and standardization the budget will stand. By requiring the individual elements to use standard codes and standard formats, a central staff component can collect the ADP tapes used by each activity and merge them on a central computer for such analyses as top management desires. Such an approach requires that top

---

1. "Management Information Systems and the Computers," Management Control Systems--Cases and Readings, by Robert N. Anthony, John Dearden, and Richard F. Vancil (Homewood, Ill.: Richard D. Irwin, Inc., 1965), p. 519.

management recognize the capability of computers to tighten coordination throughout the organization. It further requires that management believe that tighter control is desirable.[1] While many organizations have not chosen to adopt this centralized approach, it is suggested here that the Department of Transportation will eventually do so, because in addition to the pressures already mentioned, the planning/programming/budgeting concept points that way.

The Bureau of the Budget directive which extended the planning/programming/budgeting system developed in the Defense Department to other Federal agencies stated that an output-oriented program structure should be designed by each agency to present data on all operations and activities in categories which reflect the agency's end purposes or objectives. It was further noted that:

> The program structure will not necessarily reflect organization structure. It will be appropriate and desirable in many cases to have the basic program categories cut across bureau lines to facilitate comparisons and suggest possible trade-offs among elements which are close substitutes. It is also desirable to develop program formats which facilitate comparisons across agency lines.[2]

The Task Force which laid the groundwork for the new Department recognized its opportunity to develop a unique organization.

---

[1] L. R. Fiock, Jr. "Seven Deadly Dangers in EDP," Harvard Business Review, May-June 1962, pp. 88-96.

[2] U. S. Bureau of the Budget Planning-Programming-Budgeting. Bulletin No. 66-3, (Washington: Oct. 12, 1965), p. 5.

An unpublished briefing paper entitled "Concept of Organization" written in late 1965 stressed the fact that the merger of existing agencies need not be bound by traditional organization lines, and that modern management principles and techniques could be used to produce a coordinated team, capable of total transportation effort. Also recommended was the consideration of a coordinated planning/programming/budgeting system for the new Department, combined with an analytic capability at the Secretary's level.[1]

To realize the unique advantages of being a new organization and to implement the spirit of the planning/programming/budgeting directive, the Department of Transportation will require a great deal of internal coordination. It will probably not be sufficient to merely patch together the present program structures and information systems. A total approach which utilizes the full potential of computers to establish the desired degree of centralized control is more likely to prove successful.

The human relations aspects of the coordination problem should not be overlooked. Steps should be taken by the central ADP staff to minimize the effects of resistance to change which may develop within the operating elements. As noted by one writer:

> Resistance to change is a fundamental attitude present in all people to different degrees. The best of plans has been known

---

[1]Interview with Task Force member, CDR David F. Lauth, USCG on January 19, 1967.

> to fail because those principally engaged in carrying out the procedure were not consulted in its development and, as a result, had made up their minds before testing, that the change would not work.[1]

ADP coordination is a complex and difficult task. Involving the managers of ADP facilities and the users of ADP outputs in the planning process will ensure that all problems and viewpoints are given proper recognition before any changes are finalized.

It has been shown that the pressures for coordination of automatic data processing in government and in the new Department are both real and strong. They stem from many causes but the overall effect is toward increased integration and standardization of ADP systems. The next chapter will discuss in more detail those steps which have already been taken to improve coordination in this important area.

---

[1]John W. Haslett, "The Systems and Procedures Department," Systems and Procedures--A Handbook for Business and Industry, ed. Victor Lazzaro (Englewood Cliffs: Prentice-Hall, Inc., 1959), p. 17.

CHAPTER IV

PROGRESS TO DATE

Several positive steps have already been taken toward the achievement of coordination of automatic data processing in the Department of Transportation. Starting prior to the President's request to the Congress for a new cabinet-level agency and continuing through the time this paper was written in March 1967, many individuals from the elements and from other governmental offices have worked long and hard to reach the point where matters now stand.

The first time that representatives of the individual elements met together to discuss ADP capabilities occurred at an early stage in the preparation of the President's proposal. Under the general supervision of Bureau of the Budget staff members, a broad study was made of the possible savings which could be realized in the ADP area, as a result of integrating and sharing present resources. Once the battle on Capitol Hill for establishment of a Department of Transportation terminated, and the identity of the elements which would be included was known, another interim group met to determine which elements would need special ADP services during the transition period from one organizational structure to another. At the same time, other members

of an Executive Task Force were attempting to work out questions of organization, assignment of functions and responsibilities, and determination of the size and grade level of the central Departmental staff. Recruitment and selection of personnel to fill staff positions was begun, and the critical question of the first year's budget was addressed.

In addition to the groups working within government lines, a management consulting firm was conducting an independent study of information needs in the Department of Transportation. This chapter will examine each of these actions in some detail, as they relate to the ADP coordination theme.

Representatives from the Bureau of the Budget, Bureau of Public Roads, Coast Guard, Federal Aviation Agency, and the Maritime Administration held several meetings in late 1965 and early 1966 on the subject of possible ADP savings. Emphasis was placed on dollar and manpower savings which could be attained through cooperative arrangements between elements, rather than on savings which individual elements could achieve within their current organizations.[1] In this way, potential savings could be directly attributed to creation of the new Department. Previous attempts to form a Department of Transportation, most of which took place prior to the computer age,

---

[1]Interview with Mr. Clark Renninger, ADP Management Branch, Bureau of the Budget, February 3, 1967.

had always been defeated in the Congress, because sufficient justification and support to overcome the opposition of carriers and industry groups could not be generated.[1] The potential savings to be realized through more efficient use of computers was recognized as a major factor in support of the current proposal.

After considering the possibilities for savings from joining the ADP capabilities of the Office of the Under Secretary of Commerce for Transportation, Bureau of Public Roads, Maritime Administration, Federal Aviation Agency, and Coast Guard in the Washington, D. C. area, the group also considered various possibilities for combinations and savings in other locations. The results of their study were submitted to the task force which was preparing the legislative proposal.[2] The report contained many qualifying phrases such as "reasonable on a conceptual basis," and "fraught with administrative difficulties," which were intended to warn a casual reader that these potential savings were only possibilities which would require a great deal more study in depth before they would be implemented and realized.[3]

---

[1]U. S. House Hearings on Creating a Department of Transportation, Part 2, pp. 819-24.

[2]Unpublished report of DOT task-force sub-group on ADP, submitted March 1966, p. 1.

[3]Interview with LCDR J. Morrow, USCG, January 19, 1967.

Among the specific items which the group believed to be deserving of further study to determine if they were, in fact, operationally and economically feasible were the transfer of some ADP work performed by private contractors to in-house facilities (at a potential annual saving of $125,000.00), the transfer of certain Coast Guard ADP work from EAM equipment to computers ($32,000.00), and the curtailment of plans to acquire a new computer for the Office of the Under Secretary of Commerce for Transportation ($64,000.00). The items in this category were felt to be attainable within two years after creation of the Department, if the necessary related decisions and actions were forthcoming.

The study report went on to identify further items of potential savings in the time frame beyond two years. One possibility considered was the consolidation of computers at the Washington Headquarters of each element into a single large-scale data processing center. An annual savings of $300,000.00 was estimated if the single center concept was adopted. A separate item involving the centrallization of personnel and pay-roll ADP functions was considered to represent a possible $100,000.00 saving each year.

Certain other items were classified as contingent on non-ADP related factors and decisions. These included the consolidation at one location of the computers performing tasks related to aircraft maintenance for the Coast Guard and the Federal Aviation Agency

($100,000.00), and the possible release of the Maritime Administration's computer ($70,000.00). The final contingent item carried the largest potential for dollar savings ($1,500,000.00), and this was the utilization of reserve computer capacity at the air route traffic control centers of the Federal Aviation Agency.

One member of the group, who characterized the study in a later interview as very rough and not done in depth, also stated that the report was pointed enough that someone else could pick it up later, and proceed from that basis toward getting something accomplished.[1] One conclusion stated in the report was that:

> Potential savings appear to be in the direction of gradually evolving rearrangements that will require program adjustments, organizational adjustments, and equipment replacements.[2]

The factors complicating any real savings of immediate nature were identified as the geographic dispersion of present ADP facilities, the extensive incompatibility between equipments, and the multi-functional nature of applications.

A final recommendation of this group pointed again to the complexity of current ADP arrangements and stressed the need for a strong ADP management staff at the Secretarial level of the new Department. The guidelines of Bureau of the Budget Circular A-61

---

[1]Mr. Renninger, BOB, February 3, 1967.

[2]Unpublished report of ADP sub-group, p. 4.

were cited in support of the recommendation that a strong central authority, which could coordinate ADP programs throughout the Department, was required.[1]

Although nearly six months elapsed before another group met to consider the problem of interim ADP services, the forces working toward ADP coordination were frequently seen in the legislative Hearings on creation of a Department of Transportation held in the Summer of 1966. The testimony of administration witnesses, cited in Chapter III of this paper, kept the possibilities of savings through ADP coordination and cooperation before the attention of the Congress. The extent to which this factor contributed to the passage of the Transportation Act can not be measured, but it was certainly of some help.

With the signing of the legislation by President Johnson, a new phase of coordinating activity began. On October 18, 1966, Vice Admiral Paul E. Trimble, United States Coast Guard, was designated the head of a new inter-agency task force to organize and staff the Department.[2] Within this task force, working groups composed of representatives from each elementand the Bureau of the Budget were

---

[1]Ibid., p. 7.

[2]U. S., Bureau of the Budget, "Memorandum for VADM Paul E. Trimble, USCG, Chairman, Department of Transportation Task Force," Washington, D. C.: October 18, 1966.

were aired in support of the recommendation that a strong federal authority, [illegible] the [illegible] programs, was required.[1]

Although [illegible] another group [illegible] Kennedy, the [illegible] in the [illegible] of a Department of Transportation bill in the [illegible] of 1966. The [illegible] Chapter III of this paper, [illegible] the [illegible] of the [illegible]. The [illegible] Transportation Act [illegible] but it was [illegible] of [illegible] help.

With the [illegible] of the [illegible], a new phase of [illegible]. On [illegible] 1966, Vice Admiral Paul E. Trimble, United States Coast Guard, [illegible] the [illegible] of a [illegible] the [illegible] Department.[2] [illegible]

[1] Ibid., p. 7.

[2] U. S., [illegible] "Memorandum for Vice Admiral Paul E. Trimble, USCG, [illegible] Department of Transportation Task Force," Washington, D. C.: [illegible] 1966.

established. The Task Force was charged with responsibility for maintaining continuity of existing operations as well as for getting the new Department established. Areas for which plans were to be developed and procedures outlined included accounting, budget, finance, personnel, office space, furnishings, services (including automatic data processing), and other administrative matters.

Coordination of ADP support was assigned to the working group for Support Services, which redelegated the responsibility for ensuring that all elements entering the new Department would receive ADP support during the transition phase to an ADP sub-group. The sub-group was staffed, among others, by two managers of computer facilities in the Washington, D.C. area, Mr. Keith Kohler of the Bureau of Public Roads and Commander Otto Unsinn, United States Coast Guard. This assignment brought together personnel with knowledge of current ADP workloads and operating practices, and was therefore a logical approach to the immediate problem of interim ADP support.

The sub-group contacted all elements entering the Department.[1] A memorandum was prepared during December 1966 listing those elements which had their own ADP capability and would require no interim services, and those elements which did not have in-house ADP capability and would require special arrangements.[2]

---

[1]Interviews with Mr. Kohler and CDR. Unsinn, December 9, 1966.

[2]Unpublished memorandum, from Chairman ADP sub-group to Chairman, Support Services working group, December 6, 1966.

The first category included the Bureau of Public Roads, Coast Guard, Federal Aviation Agency, and the High Speed Rail Transportation component within the Office of the Under Secretary of Commerce for Transportation. The sub-group recommended that these elements continue present ADP operations.

The second category included the Bureau of Safety of the Civil Aeronautics Board, two offices in the Under Secretary of Commerce for Transportation organization, two segments of the Interstate Commerce Commission, and the Saint Lawrence Seaway Development Corporation. In each case it was determined that the elements could continue obtaining ADP services from its present source on an interim basis, and the sub-group recommended that this be done.

The Support Services working group considered the question of ADP and other services for the Office of the Secretary of Transportation. After it had been determined that the Office of the Secretary would be on the 8th floor of the Federal Aviation Agency building, the responsibility for providing general administrative support to that office was assumed by the FAA. Accounting services were assigned to the Coast Guard and payroll support for the Office of the Secretary was made the responsibility of the Bureau of Public Roads.[1]

The organization structure for the new Department had

---

[1]U. S. Coast Guard Commandant's Bulletin, (Washington, D. C., December 23, 1966), p. 5.

begun to take shape in January 1967. Figure 1 presents a general view of the organization as visualized by the official employee publication of the Federal Aviation Agency.[1]

Many of the organizational details such as assignment of functions and responsibilities, staff size, actual selection of personnel, and lines of authority had not been finalized at the time this paper was written. The staff component with central ADP management responsibility was expected to be assigned under the Assistant Secretary for Administration. Civilian employees on the ADP staffs of the individual elements had been given an opportunity to request transfer to the Departmental staff. The Bureau of the Budget was reported to be considering a reduction in the number of staff personnel recommended by the Task Force, which was delaying the actual selection and assignment of persons to jobs.[2]

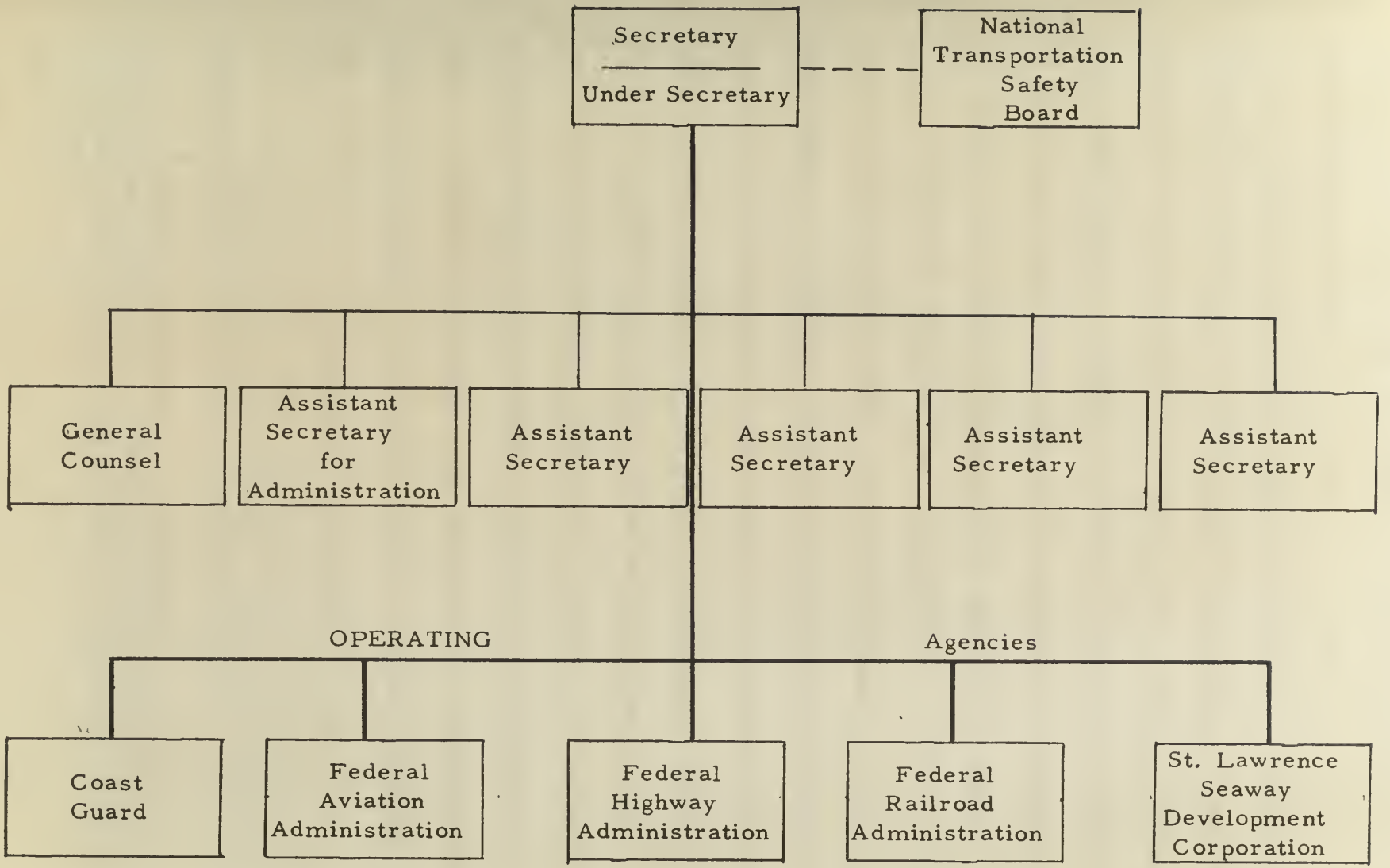
While the results of these organizational birth pangs will have a considerable effect on the future of ADP coordination in the Department of Transportation, none may have as great a significance as the results of a private consulting firm's study of the information needs of the Department, which was being conducted during the same time frame. The gentleman who did most of the work on this study is a widely recognized expert in the systems engineering field, and the

---

[1] FAA Horizons. (Washington, D.C.: January, 1967), p. 15.

[2] Interview with CDR D. Lauth, USCG, January 19, 1967.

DEPARTMENT OF TRANSPORTATION



former head of the ADP management branch of Bureau of the Budget, Mr. William A. Gill.

As described by Mr. Gill,[1] the emphasis in his study was on finding and establishing a philosophical and conceptual groundwork for the flow of transportation information between Federal, State, and local government bodies. Mr. Gill stressed the need for a determination of information requirements at all levels before any attempt is made to design an ADP information system to meet those needs.

Since the objectives and responsibilities of the new Department of Transportation require that its Secretary and other top officials think in terms of all modes of transportation, Mr. Gill believed that a wonderful opportunity now existed to plan for an information system which would foster and promote multi-modal thinking at State and local levels as well. He pointed out that about 50 per cent of the information concerning movement of people and commodities in the United States is not presently reported or published in any form. Many carriers and activities such as municipal transport authorities which do gather and report such statistics, utilize codes and reporting systems which are unrelated and incompatible.[2]

---

[1] Speaking to the Navy Graduate Financial Management Class, George Washington University, February 15, 1967.

[2] Although not specifically mentioned by Mr. Gill, the codes and reporting systems of the Federal agencies studied in the course of preparing this paper were also found to bear little similarity to each other.

The conclusions which Mr. Gill intended to report to the Secretary of Transportation in late February 1967 were that a staff component devoted to information planning in the broadest sense should be established at a high level in the Departmental structure, and that personnel with the ability and background to think and plan in terms of all modes should be assigned to it. This component would determine and plan for the information needs of all levels of the Department, as well as those of State and local governments, carriers, other transportation interests, and the public.

The impact of such a total philosophy, if adopted, on the automatic data processing systems of the Department would be tremendous. Once total needs were determined, common languages and reporting systems could be designed. The integration of systems would become standard, and a maximum of ADP coordination would be the normal environment. Expansion of present systems to handle the great increase of information flow would be required, and all changes and increases to the ADP network could be made to conform to the new multi-modal pattern.

It may take some time for this broad planning concept to permeate the activities of the operating elements. Many practical difficulties and problems obstruct its realization. Yet, it would be illogical to dismiss this type of thinking too lightly. It falls right in line with the goals and objectives of the Department of Transportation stated in chapter I. It is responsive to the pressures for

increased ADP coordination described in chapter III. The first steps have already been taken. Adopting anything less than a total approach may just be postponing the inevitable and wasting valuable time.

CHAPTER V

SUMMARY AND CONCLUSIONS

The Department of Transportation is the newest cabinet-level agency in the Executive Branch of the government of the United States. With nearly 100,000 employees and an annual budget of about $6 billion, it represents a long awaited attempt to coordinate Federal activity in the transportation field.

The Department was created because of a need to improve on an existing situation. Responsibility for various government policies and programs in this field had been scattered among a wide variety of agencies. Criticism of the lack of central leadership was heard from many sources. Consolidation of information and research effort was urged in such fields as transport safety and accident prevention. The growth of all modes had brought about the increased investment of government funds. It becameevident that the establishment of a separate Department to deal with the problems of the present and the future was required.

The objectives of the new Department include the coordinated, effective administration of transportation programs, promotion of the nation's transportation system, and development of national

transportation policies. Particular attention is to be given to safety, and to strengthening the weak points of the present transport complex. The tasks facing the new Secretary and his central staff are formidable. The first test of their ability to solve the nation's transportation problem will be the facility with which they can coordinate the efforts and capabilities of individual elements assigned to the Department into a unified organization.

The elements which were placed in the new Department include both staff components and operating agencies. The office of the Under Secretary of Commerce for Transportation with some 150 persons and $28 million annual budget brings a familiarity with general transportation problems and broad policy development into the Department. The head of that office, the Honorable Alan S. Boyd, has been appointed as the first Secretary of Transportation. The Bureau of Public Roads with nearly 5800 persons and an $4.5 billion budget was also transferred from the Commerce Department to the Department of Transportation. This element is responsible for a variety of functions relating to the nation's highways. It contributes an important segment of the automatic data processing capability and expertise available to the Department. A wide range of administrative and engineering applications is currently being processed on the Bureau's computers.

The United States Coast Guard with its 41,000 military and

civilian employees and $500 million budget brings a variety of maritime transportation functions into the Department. ADP applications at present include administrative, engineering, and oceanographic research, as well as the vessel reporting system for search and rescue assistance to aircraft and shipping in both the Atlantic and Pacific oceans. The Federal Aviation Agency contributes a staff of over 44,000 persons and a $1 billion budget to the new Department. In addition to extensive ADP systems for administration of its many aviation programs, the FAA also brings multi-million dollar, real-time computer systems used in air traffic control.

Segments of the Interstate Commerce Commission dealing with safety and accident investigation for railroads, bus, truck, and pipeline carriers comprising about 500 persons and carrying a $6 million budget were transferred to the Department of Transportation. The component of the Civil Aeronautics Board with responsibilities for aircraft safety and accident investigation contributes nearly 200 persons and a $3.5 million budget as well as an extensive computerized approach to analysis of the cause of accidents.

Other elements included in the Department are the Great Lakes Pilotage Administration, St. Lawrence Seaway Development Corporation, and the Alaska Railraod. Many differences in size, functions, and ADP capability are evident among the various elements. A wide range of ADP applications exists.

Pressures for coordination of automatic data processing in all government agencies have grown steadily stronger in recent years. A need for specialized treatment of ADP and electronic computers was recognized in the 1950's. Intensive studies were undertaken under the direction of the Bureau of the Budget. The General Accounting Office has issued many critical reports on various phases of ADP management. Several Congressional committees have held Hearings on the subject and legislation was enacted in 1965 to cope with the problem on a government-wide basis.

The responsibilities for coordination of ADP which are presently assigned to the head of each government agency include agency-wide planning, control of equipment utilization, development of data systems, and the merging or integrating of data systems irrespective of organizational lines. Coordination on a government-wide basis is the responsibility of the General Services Administration. Increased emphasis on standardization of data systems is being applied within the Department of Defense. It appears that this trend will spread to other agencies.

The government-wide pressures for coordination of ADP are supplemented within the Department of Transportation by the needs and objectives of the new organization. Coordination of transportation policy and effort was one of the major causes for creation of the Department. Speedy and smooth integration of the existing elements will lay the

groundwork for later expansion of functions and powers. Coordination for the purpose of effecting savings in ADP operations was forecast prior to passage of the Transportation Act. Realization of these savings will require intensive effort by a central staff.

Recent trends in the ADP industry toward standardization of languages and compatibility of equipments will enhance this effort. Complex problems are introduced by the differences between computer installations and by varying theories on what constitutes the proper management information system for a large organization. The capability of computers to tighten controls throughout an organization will not be realized unless top management both recognizes the possibility and desires that it be done.

The planning/programming/budgeting system represents another pressure toward coordination and integration of ADP systems. Output-oriented program structures must be developed which facilitate comparisons across organizational lines. The opportunity offered by the creation of a new Department to avoid the restrictive effect of tradition was recognized by the organizational Task Force. A total approach to developing new program structures and information systems appears more likely to prove successful than an approach which patches together present systems. Resistance to change should be minimized by seeking to involve the managers of ADP installations and the users of ADP services in the planning and development process.

Several positive steps have already been taken toward achieving ADP coordination in the new Department. The early meetings on savings between personnel from each element and the representatives of the Bureau of the Budget considered various methods for combining and sharing capabilities. Items recommended for further consideration and in-depth study included the transfer of contractor work to in-house facilities, consolidation of ADP facilities at several locations, and the possible use of reserve computer capacity at the Federal Aviation Agency's air route traffic control centers. Complications hindering quick realization of savings were identified as the geographic dispersion of present ADP facilities, extensive incompatibility between equipments, and the multi-functional nature of ADP applications. A recommendation for a strong central ADP management staff in the new Department concluded the report of this study group.

Further coordinating action was undertaken by the Task Force for organization and staffing of the new Department in the months following enactment of the legislation. The ADP sub-group of the Support Services working group contacted all elements entering the Department to identify needs for ADP support. Elements with existing capabilities such as the Bureau of Public Roads, Coast Guard, and Federal Aviation Agency were designated to assume some additional tasks as well as continuing present ADP operations. Elements obtaining ADP services from other sources were authorized to continue doing so on an interim

basis.

Many details of organization and staffing had not been finalized when this paper was written. A separate study by a private firm was in progress to determine the information needs of the Department of Transportation at all levels. A total approach to information flow between Federal, State, and local government bodies was under consideration. The recommendations from that study would include, according to Mr. Gill, the establishment of a staff component for all-modal information planning at a high level in the Departmental structure. The impact of the total information concept would be to further integrate and standardize data systems. It would complement the goals of the Department as well as responding to the numerous pressures for ADP coordination.

It is believed that the more substantive questions raised in the introduction to this paper have now been answered. The identity of the Department and its elements, the reasons for its creation, and the objectives which it hopes to attain, have all been established within the limitations of this work and its author. Factual answers have also been given to the questions of how much ADP coordination is required and what has been accomplished so far.

More difficult to answer is the question of how much coordination is "right," in a prescriptive sense, for this Department. This decision requires a value judgment. The experience and interests of

the one making the appraisal must have some effect on his concept of "rightness."

The personal conclusion which has been drawn is that increased standardization and integration of systems is both inevitable and desirable. The long history of scattered responsibility and incoherent policy in the Federal transportation domain should not be allowed to continue. The demands of a 21st century transportation system must soon be met. With vigorous coordination, the computer can be a most useful tool for solving the problems of the present and meeting the challenges which lie ahead. Based on this conclusion, the following recommendations are offered.

As soon as the initial confusion of establishing and staffing the Department has subsided, an in-depth, realistic appraisal should be made of the value to be gained from various methods of integrating and standardizing present ADP systems. Over-simplified approaches should be avoided, but a total approach should be used to the greatest possible extent. Dollar savings are not necessarily of first importance. Operational equipments should not be appraised under the same ground rules as administrative systems, but all present and potential ADP applications and needs should be considered.

A considerable number of trained and dedicated persons are already present within the structure of the Department. Their knowledge and ideas should be incorporated into the intensive study which is being

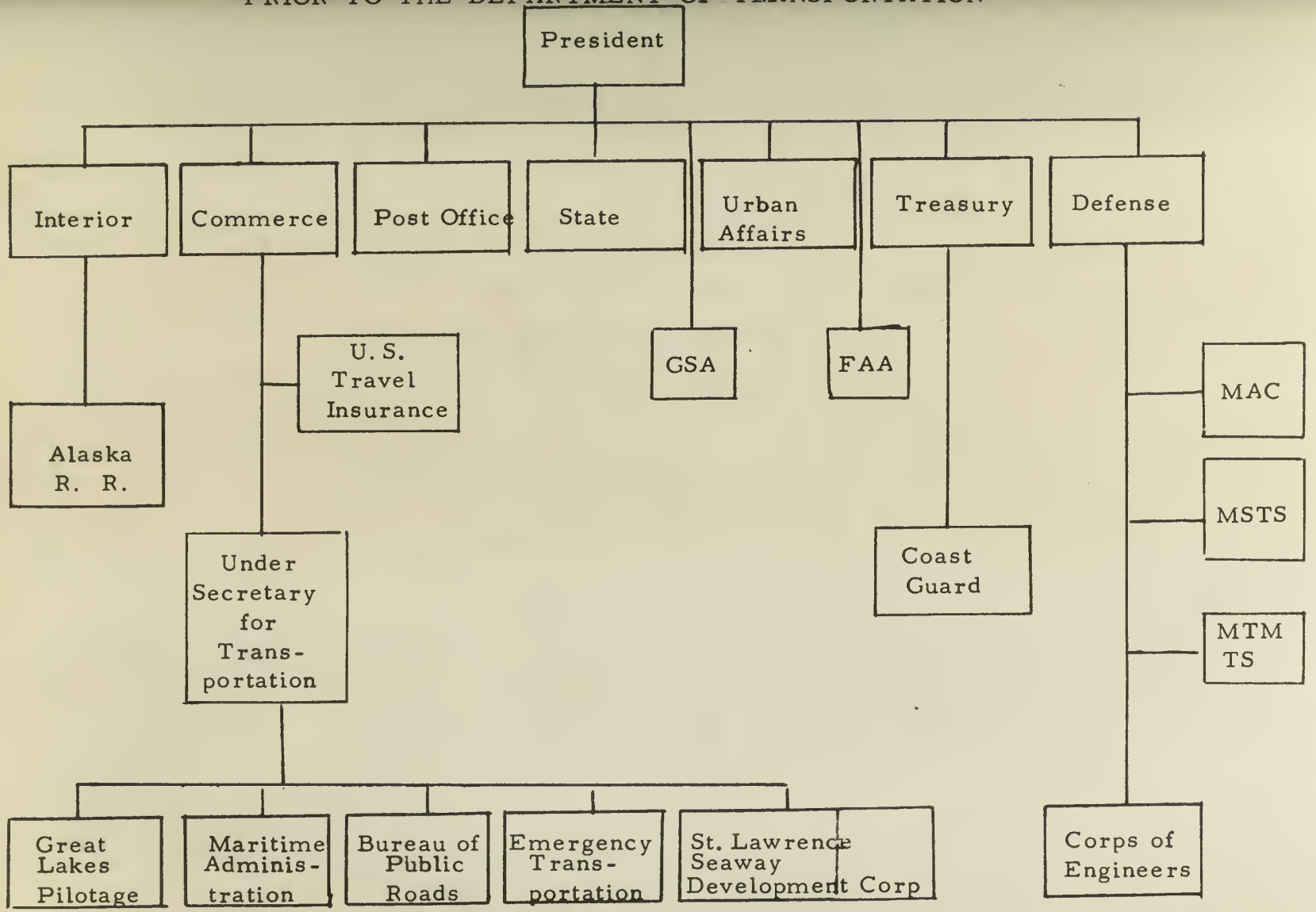
recommended here. Every attempt should be made to encourage and reward thinking which goes beyond narrow, jurisdictional lines and promotes a total team effort. Coordination between the central ADP staff, operating elements, and the component working on total information needs will be crucial.

Sufficient time should be allowed for the study so that all factors can be properly considered. Conducting this research has given this observer a somewhat better understanding of the complexities and difficulties involved with achieving a high degree of ADP coordination in a large, newly-created organization of diverse elements. The problems of the operating agencies and the effects of any proposed changes should be considered as well as the desires of top management and the needs of the over-all organization and the public.

Once a through study has been made, a balanced plan of action, which takes all these factors into account, should be prepared, approved, and firmly implemented. Unjustified resistance from any source should not be allowed to impede progress. Problems and difficulties must be faced up to and dealt with. If the trees are allowed to obscure the forest for too long, the new organization may acquire the rigidity of maturity, and a unique opportunity will pass by, unrealized.

APPENDIX A

TRANSPORT RESPONSIBILITIES IN THE EXECUTIVE BRANCH
PRIOR TO THE DEPARTMENT OF TRANSPORTATION



[1]Excluded from this chart because they are technically not partof the Executive Branch are the three quasi-judicial bodies which regulate freight rates, passenger fares, routes, and mergers. (i.e. The Interstate Commerce Commission, The Civil Aeronautics Board, and the Federal Maritime Commission.)

OFFICE OR AGENCY	RESPONSIBILITY
President	Rules on matters relating to international air transport by U. S. air carriers and foreign air carrier operations to the U.S. Appoints members of Federal agencies and appoints chairman of CAB and FMC.
Department of State	Advises on negotiations with foreign governments for air routes and services and on international shipping.
Department of Housing and Urban Development	Administers a variety of federally aided housing and community development programs including grants and loans to improve urban mass transportation systems and facilities.
Department of Commerce	Fosters, promotes, and develops U. S. transport facilities. Advises on Federal transport policy and programs. Develops overall policies on emergency transport control and allocation. Responsible for activities of the following:
U. S. Travel Service	Promotes travel to U. S. by residents of foreign countries.
Office of Under Secretary for transportation	Serves as principal advisor on transport policy with the Department and on overall transport policy in the Executive Branch, including mobilization. Exercises policy direction over the following organizations:
Office of Emergency Transportation	Develops and coordinates overall policies for the provision of centralized control of all modes of transportation in an emergency, including the proper apportionment and allocation of the total civil transportation capacity.
Bureau of Public Roads	Administers Federal highway construction, research planning, safety programs, and Federal-aid highway funds.
Maritime Administration	Promotes merchant marine; grants mortgage insurance; determines ocean services; ship requirements and national defense features and maintains National Defense Reserve Fleet. In Maritime Subsidy Board awards subsidies, determines the degree of services and specifies routes of subsidized operators.

APPENDIX A--Continued

OFFICE OR AGENCY	RESPONSIBILITY
Great Lakes Pilotage	Controls a system of mandatory pilotage on certain U. S. waters of the Great Lakes and St. Lawrence Seaway.
St. Lawrence Seaway Development Corp.	Administers the operation and maintenance of the U. S. portion of the St. Lawrence Seaway, including rates of tolls.
Post Office Department	Initiates and administers programs governing procurement and utilization of mail transport, distribution and routing.
Department of the Interior	Supervises and controls the functions of the Alaska Railroad. Develops and coordinates policy for oil and gas (including pipelines), and provides for a standby Emergency Petroleum and Gas Administration.
Federal Aviation Agency	Promotes civil aviation generally, inlcuing research and promulgation and enforcement of safety regulations. Develops and operates the airways, including facilities. Administers Federal airport prlgram.
Military Sea Transport Service	Provides ocean transportation for personnel and cargo of the Department of Defense and, as directed, for other agencies and departments of the United States.
Military Airlift Command	Provides air transportation for personnel and cargo for all military services on a world wide basis.
Military Traffic Management and Terminal Services	Procures commercial transportation service for DOD passengers and freight within the Continental United States; and manages and operates common-user ocean terminals.
Corps of Engineers	Constructs and maintains river and harbor improvements. Administers laws for protecting navigable waterways.

APPENDIX A--Continued

OFFICE OR AGENCY	RESPONSIBILITY
Coast Guard	Provides navigational aids to inland and offshore water and trans-oceanic air commerce; enforces federal maritime laws; and regulates maritime safety, including approval of plans for vessel construction and repair.
General Services Administration	Provides and procures transportation services, including motor vehicle management for the executive agencies. [1]

[1]Source of information for this summary: U. S. Senate Hearings on S. 3010. Part 4., p. 728

APPENDIX B

ADDITIONAL DATA ON ADP CAPABILITIES OF D.O.T. ELEMENTS[1]

1. Demonstration Division, Office of High-Speed Ground Transportation, Commerce Department.

IBM 1440, 12K computer.	2311 disc unit.
Kimball KR-1200 Reader.	
1442 card-read-punch.	Leased. (Approx: $5500/month)
1443 printer.	Staff of 5.

2. Bureau of Public Roads:

IBM System/360 model 50.	Leased. (Approx: $33,000/month)
3 selector channels.	Staff of 71.
1 multiplexor channel.	
4 2311-1 disc units.	(Being replaced by above system)
2 2540-1 card-read-punch.	
2 1403-N1 printers.	IBM 7010.
10 2400 series tape drives.	2 IBM 1401 computers.
1 1052-7 typewriter console.	

3. Coast Guard:

IBM 1410, 40K computer.	Owned.
1301 disc drive.	Staff of 63.
5 tape drives.	
IBM 1130/computer	Owned.
8K	Staff of 3.

4. Federal Aviation Agency:

IBM 1401, 16K computer.	Leased.
1402 card-read-punch.	
1403 printer.	(Scheduled for early replacement
1311 disc unit.	by IBM System/360 model 30.)
5 tape drives.	

---

[1]Data shown for Headquarters installations only. Source: interviews Jan. 1967 and agency reports. Should be used for rough comparison only due to frequent changes.

[illegible]

APPENDIX C

ADDITIONAL DATA ON ADP APPLICATIONS OF D.O.T. ELEMENTS[1]

1. Summarized totals by broad functional areas:[2]

Functional area	Number of Computers	Number of Locations
Administration	23	15
Payroll	17	11
Research, Planning, & Engineering	16	7
Logistics Management	18	12
Certification, Identification, & Location	8	2
Overhaul & Maintenance	10	9
Training	8	4
Unique to Agency	8	7

2. Summarized totals of multi-functional operations:[2]

Number of functional areas processed:	1	2	3	4	5	6	7	8
Number of computers	21	4	2	9	4	2	1	1

[1] Source: Unpublished report of ADP-sub-group, D.O.T. Task Force, March 1966.

[2] Figures intended to illustrate wide variety of computer applications, and have not been corrected for changes since March 1966. Except for subtraction of 1 Maritime Administration computer which was included in that study, all changes would be additive to reflect steady growth in computer utilization by all agencies.

APPENDIX C--Continued

3. Congressional Hearing and Reports.

House of Representatives, Committee on Post Office and Civil Service, Subcommittee on Census and Statistics:

"Use of EDP Equipment in the Federal Government," (August 31, 1960)

"Use of EDP Equipment in the Federal Government," House Report 858 (October 16, 1963).

"Government EDP Systems" (June 14, 15, 28, 29 1966).

House of Representatives, Committee on Government Operations, Subcommittee on Government Activities:

"Hearings on H.R. 5171," House Report 428, (May 1963).

"Hearings on H.R. 4845," (March-April 1965).

(Similar bills. H.R. 5171 failed in Senate. H.R. 4845 became P.L. 89-306)

4. Legislation.

Public Law 89-306-(A Law to provide for the economic and efficient purchase, lease, maintenance, operation, and utilization of ADP equipment by Federal departments and agencies.), October 30, 1965.

APPENDIX D

REPORTS, STUDIES, HEARINGS, AND LEGISLATION RELATING TO THE COORDINATION OF ADP IN THE FEDERAL GOVERNMENT[1]

1. Comprehensive government-wide studies and reports of the Comptroller General. (GAO file No. B-115369 applies to each of the following 4 reports.)

   "Summary of Progress and Trend of Development and Use of ADP in Business and Management Control Systems of the Federal Government as of December 1957," (June 1958).

   "Review of ADP Developments in the Federal Government." (December 1960).

   "Study of Financial Advantages of Purchasing Over Leasing of Electronic Data Processing Equipment in the Federal Government," (March 1963).

   "Review of Problems Relating to Management and Administration of EDP Systems in the Federal Government," (April 1964).

2. Studies and Reports sponsored by the Bureau of the Budget.

   "Report of Findings and Recommendations Resulting from the ADP Responsibilities Study, September 1958-June 1959," (1959). Reprinted in Hearings on H.R. 4845, 89th Cong., 1st sess., p. 567-614.

---

[1]Source: U.S. House of Representatives, Committee on Government Operations. Report on H. R. 4845--ADP Equipment. Union Calendar No. 360, House Report No. 802, 89th Cong., 1st Sess., August 17, 1965, and U.S. House of Representatives, Committee on Post Office and Civil Service. Hearings on Government EDP Systems. 89th Cong., 2d sess., June 1966.

APPENDIX D--Continued

"Report to the President on the Management of ADP in the Federal Government," (March 1965). Printed as Senate Document 15, 89th Cong., 1st sess.

BIBLIOGRAPHY

Public Documents

U.S. Bureau of the Budget. Guidelines for Appraising Agency Practices in the Management of Automatic Data Processing (ADP) Equipment in Federal Agencies, Circular No. A-61, August 3, 1963.

_____. Inventory of ADP Equipment in the Federal Government, July 1966.

_____. Planning--Programming--Budgeting. Bulletin No. 66-3, October 12, 1965.

U.S. Comptroller General. Report of Review of Problems Relating to Management and Administration of Electronic Data Processing Systems in the Federal Government. GAO File No. B-115369, April 30, 1964.

U.S. Department of Commerce. The United States Department of Commerce Promotes Economic Growth--A Guidebook to Commerce: Agency of Business, April 1966.

U.S. Federal Aviation Agency. Agency ADP Study. Vol. 1, October 8, 1963.

_____. The Federal Aviation Agency, September 1964.

_____. System Description--National Airspace System En Route Stage A, April 21, 1965.

U. S. House of Representatives, Committee on Government Operations, Report to Accompany H.R. 15963--Department of Transportation Act. Report No. 1701. 89th Cong., 2d Sess., July 15, 1966.

_____. Committee on Government Operations, Subcommittee on Executive and Legislative Reorganization. Hearings on H.R. 13200--Creating a Department of Transportation. Parts 1 and 2. 89th Cong., 2d Sess., April-June 1966.

U.S. House of Representatives, Committee on Government Operations, Subcommittee on Government Activities. Hearings on H.R. 4845--Automatic Data Processing Equipment. 89th Cong., 1st Sess., March-April 1965.

_____. Committee on Government Operations. Report on H.R. 4845, ADP Equipment. Union Calendar No. 360. Report No. 802. 89th Cong., 1st Sess., August 17, 1965.

_____. Committee on Post Office and Civil Service, Subcommittee on Census and Statistics. Hearings on Government Electronic Data Processing Systems. 89th Cong., 2d Sess., June 1966.

_____. Conference Report--Department of Transportation Act. Report No. 2236. 89th Cong., 2d Sess., October 12, 1966.

U.S. Public Law 89-306--Economic and Efficient Purchase, Lease, Maintenance, Operation, Utilization of ADP Equipment by Federal Departments and Agencies. H. R. 4845. 89th Cong., 1st Sess., October 30, 1965.

U.S. Public Law 89-670--Department of Transportation Act. H.R. 15963. 89th Cong., 2d Sess., October 15, 1966.

U.S. Senate, Committee on Government Operations. Hearings on S. 3010--Establish a Department of Transportation. Parts 1 to 4. 89th Cong., 2d Sess., March-June 1966.

_____. Committee on Government Operations, Report to Accompany S. 3010--Establishing a Department of Transportation. Calendar No. 1627. Report No. 1659. 89th Cong., 2d Sess., September 27, 1966.

_____. Committee on Government Operations. Report to the President on the Management of Automatic Data Processing in the Federal Government. Document No. 15, 89th Cong., 1st Sess., March 4, 1965.

Books

Chapin, Ned. An Introduction to Automatic Computers. 2d ed. D. Van Nostrand Co., Inc., 1963.

Costello, T. W., and Zalkind, S. S. Psychology in Administration. Englewood Cliffs: Prentice-Hall, Inc.

Fromm, Gary (ed.) Transport Investment and Economic Development. Washington: The Brookings Institution, 1965.

Gregory, Robert H., and Van Horn, Richard L. Automatic Data Processing Systems--Principles and Procedures. 2d ed. Belmont: Calif.: Wadsworth Publishing Co., Inc., 1965.

McCarthy, E. J., and McCarthy, J. A. Integrated Data Processing Systems. Edited by D. Humes. New York: John Wiley & Sons, Inc., 1966.

Owen, Wilfred. Strategy for Mobility. Washington: The Brookings Institution, 1964.

Parkhill, Douglas F. The Challenge of the Computer Utility. Reading, Mass.: Addison-Wesley Publishing Co., 1966.

Philipson, Morris (ed.). Automation--Implications for the Future. New York: Vintage Books, 1962.

Schmidt, Richard N., and Meyers, William E. Electronic Business Data Processing. New York: Holt, Rinehart and Winston, 1963.

Solomon, Irving I., and Weingart, Laurence O. Management Uses of the Computer. New York: Harper & Row, Publishers, 1966.

Wolfe, Roy I. Transportation and Politics. Princeton: D. Van Nostrand Co., Inc., 1963.

Yoshpe, Harry B., and Brown, Fred R. Transportation: The Nation's Lifelines. Washington: Industrial College of the Armed Forces, 1961.

Articles and Periodicals

"A New Cabinet Post is Created, but---," U. S. News and World Report. October 24, 1966, p. 12.

Fiock, L. R., Jr., "Seven Deadly Dangers in EDP," Harvard Business Review. XXXX, No. 3, May-June 1962, pp. 88-96.

"Getting There is Hardly Ever Half the Fun," Time. November 4, 1966, p. 48.

Leavitt, Harold J. and Whisler, Thomas L. "Management in the 1980's." Harvard Business Review. XXXVI, No. 6, November-December 1958, pp. 41-48.

Meyer, John R. "Transportation in the Program Budget." Program Budgeting. Ed. David Novick. Washington: Government Printing Office, 1965.

The New York Times. June 1966-March 1967.

"Untangling the Nation's Lifeline." Business Week. November 26, 1966, p. 111.

The Washington Post. June 1966-March 1967.

Whisler, Thomas L. "The Manager and the Computer." The Journal of Accountancy, January 1965.

Unpublished Material

D.O.T. Task Force, "Concept of Organization," 1965. (Typewritten.)

_____. "Designation and Duties of Interagency Task Force." BoB Memorandum for VADM Trimble, USCG, Oct. 18, 1966.

_____. "Provision of Interim ADP Support." Memorandum for Chairman, Support Services Working Group, Dec. 6, 1966.

_____. "Report on Potential Savings in ADP Activities Resulting from the Creation of the Department of Transportation." March 1966. (Typewritten.)

Other Sources

Bureau of the Budget. Personal Interview with Mr. Clark Renninger, ADP Management Branch, February 3, 1967.

Bureau of Safety, Civil Aeronautics Board. Personal Interviews with Mr. Albert Goldman, and Mr. Forris Hollowell, January 30, 1967.

Coast Guard. Personal Interviews with CDR D. Lauth, CDR O. Unsinn, LCDR J. Morrow, LCDR K. Palfrey, ENS DeChamps, and ENS Wegner, December 1966-February 1967.

Department of Commerce, Under Secretary for Transportation, Office of Transportation Data Systems. Personal Interview with Mr. Robert Brown, Jan. 25, 1967.

_____. Office of High Speed Ground Transportation. Personal Interview with Mr. Robert Haden, Jan. 25, 1967.

_____. Bureau of Public Roads. Personal interviews with Mr. K. Kohler, Mr. K. Closs, and Mr. J. Ledford, Jan. 24, 1967.

Federal Aviation Agency. Personal interviews with A. Cowart, M. Francis, T. Grieg, J. Rickard, J. Seitz, and L. Yarnell, January 1967.

General Services Administration. Personal interviews with Mr. Robert Brennan, and Mr. Joseph Flynn, February 8, 1967.

Gill, William A. "Economic Considerations in the Use of Electronic Computers." Talk delivered at the American Management Association Briefing Session on Computer Economics. New York, June 29, 1962.

_____. "Role of the Systems Engineer in the Federal Government." Talk delivered to the Navy Graduate Financial Management Class, George Washington University, February 15, 1967.

Interstate Commerce Commission. Personal Interview with G. Greene, ADP programming staff, Jan. 25, 1967.